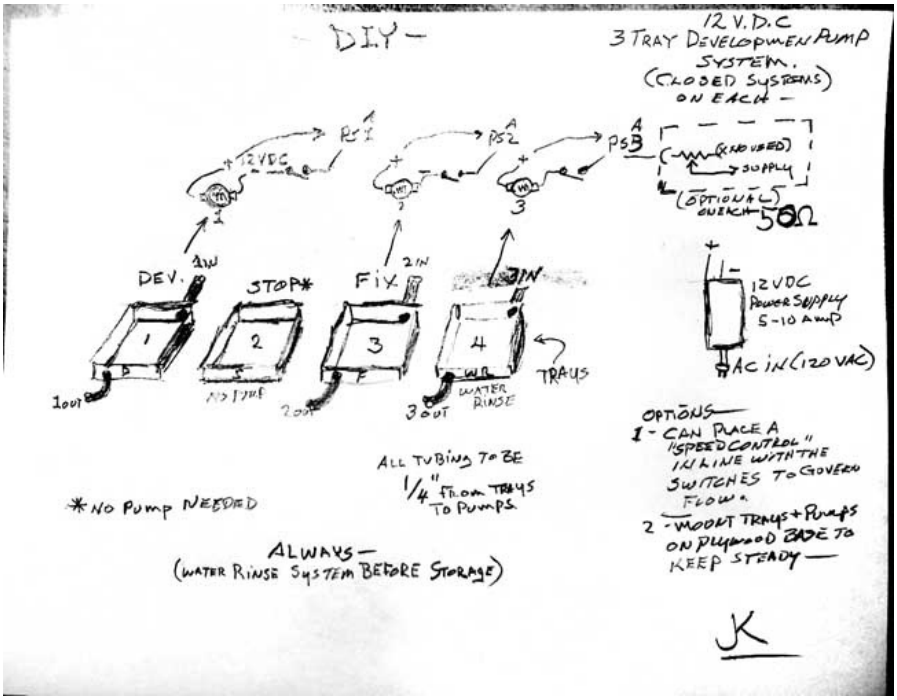
A Build of A Circulating Photo Pint Tray Developing System

Being that I have a desire to make my own equipment for almost anything, I have designed a “closed liquid pumping system”. This shall have the chemicals, of the developing process, flow over the photo paper instead of lifting the trays and risk the possibility of sploshing onto the work counter (table). Being that it is usually my practice to just work from plans I “see” in my “*mind’s eye*”, this time I have made a sketch of what I am about to build so that others may get some idea of what I saw in my Mind.



Here is the sketch of what I have seen in my mind. This will change - As I do not have really any “written-in-stone” rules. And Thus no limits. (If you start limiting yourself, all creativity goes out the window.)

Acquiring the parts -

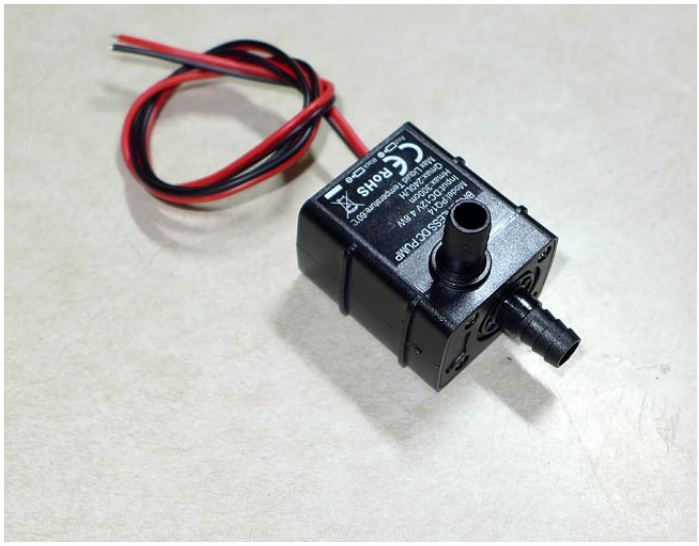
The pump units (small “fountain birdbath”) I bought from Amazon. The power supply was in my “spare parts bin”, along with the wiring, switches, and tubing. Some small screws to hold the pump brackets, and hose clamps, in place, and plywood base.

Tools -

I have a good assortment of tools - However - all that is really needed is a few hand tools. (i.e.= Measuring tape, screwdrivers, hand saw, drill motor, and some drill bits.) You should paint the base to have it water resultant - however - I did not as this is a “prototype” and I really do not care with it looks like. The main thing is that it works, and works well as designed. The photos in this article are intended as a guide for anyone that would wish to make one of their own - As well as making any improvements that they might be better.

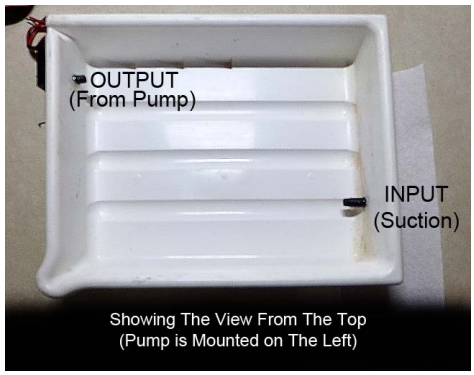
Here is a good pumping system:

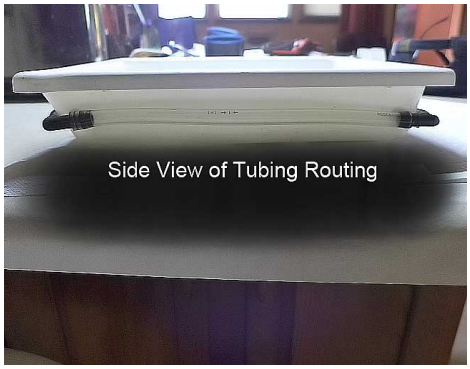
- I think that is a little too large of a system for our use.

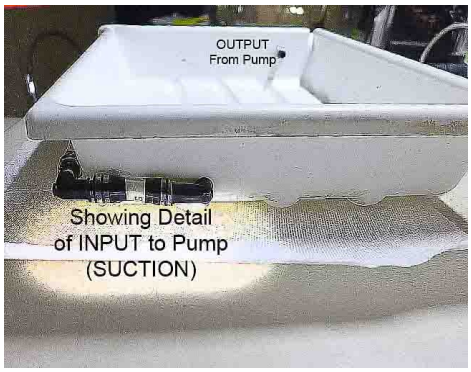


OK! This is better for the intended use for darkroom tray developments.
A total of three will be needed.
“Specs”:
Brushless D.C. Motor / Model: PQ-14
12 V.D.C. / 4.8 Watts
240 Liters per Hour
(Motor and pump all in one.)

As I said before “Nothing is written in stone”... I made a design alteration that elimanates the need for a support platform. I mounted the pump, tubing, and fittings to the tray. As shown below”:

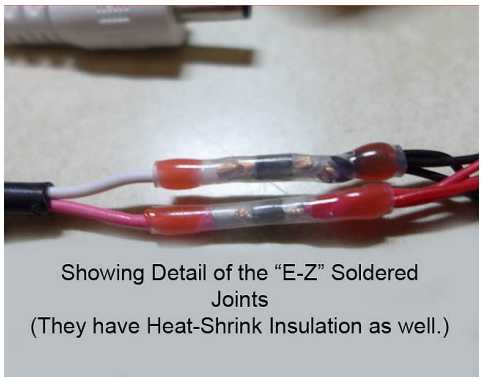


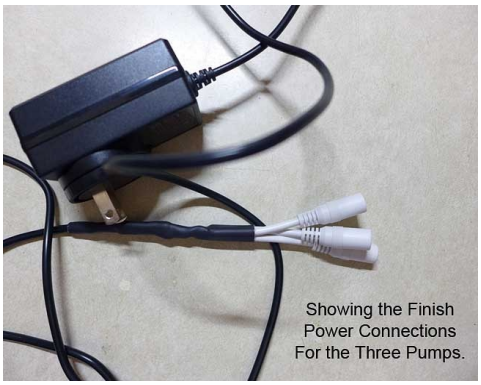




After drilling two holes in the rear and forward sides of the tray, I then used CA Glue (“super glue”) first and attached the pump to the wall of the tray to hold it in place. After that dried I used silicone sealant “bathtub calk” to have the holes for the output and input not leak.

Next step, while the sealant was curing, I turned my attention to the more easier part of this project. The wiring. (*It is very straightforward in that this is a Direct Current powered motor on the pump. And a low voltage of only 12 volts.*) The only truly confusing bit was that in some other countries they have a different color code system which is different from the one in the U.S. So... I had to determine the correct polarity of the wires from the salvaged power supply and that of the motor of the pump. This was accomplished with the use of a simple voltmeter. On the power supply the oddly colored positive was a light shade of red, almost a pink -- while the motor had a bright True red color. That was easy. The negative wire was WHITE not Black. The motor’s negative was BLACK. Thanks to the checking with the volt meter I could tell as to what wire goes with the CORRECT Negative and Positive. (*Use the FEMALE connector on the power supply wires.*) So... My advice at this point is, to anyone building electrical things - You Gotta Check to be Correct.


Showing Detail of the "E-Z" Soldered Joints
(They have Heat-Shrink Insulation as well.)


Showing the Finish Power Connections For the Three Pumps.

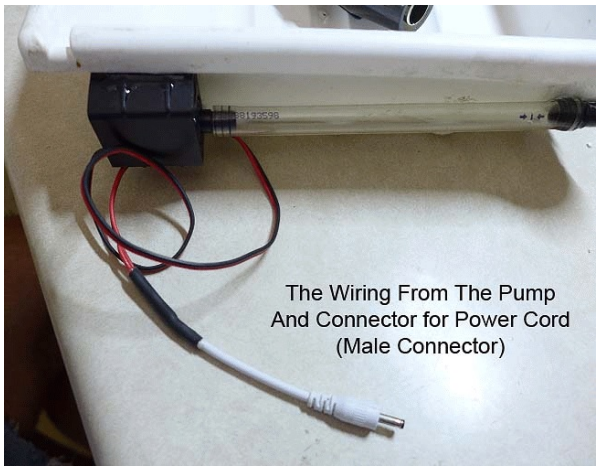
Looking at the photos above - you can see that I put three connectors onto the one power supply, and using some "E-Z" splice connectors, attached them to the positive and negative wires from the 12 Volt D.C. supply. (*The power supply was that of 2.5 Amp output, and enough to power all three of the pump motors.*) To have a nice appearance and to strengthen the part where the splices were made, I used some heat-shrink insulation to make a better bond at this point.

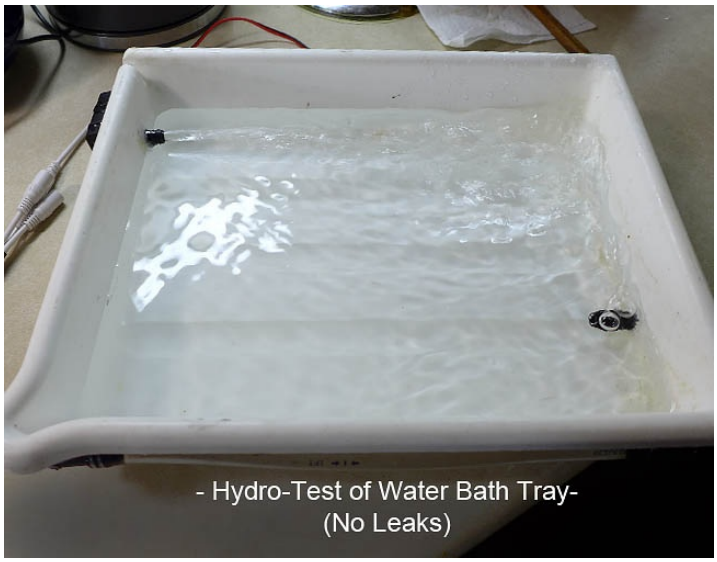
NOTE====

((*By the way - the splice connectors that I often use have solder within them. Just heat them up, with a high heat source or small propane torch, (not a hair dryer), and watch the heat shrink and solder do its "thing". = No advanced knowledge of the "art" of soldering needed. Only thing is = do NOT move it till it is cool = and do not touch it either. (If you use a lighter or propane torch, use a very small flame, and NOT very long as you will burn the insulation and overheat the solder.*))

Next was wiring the male connector to the wires of the pump motor. Another rather straightforward bit of work. (*The connectors I used were, again, salvaged parts for other electronic equipment that I had saved. Most often the RED Positive is the Center post, and the inside "ring" of the connector is the BLACK Negative. (Hopefully - Always check = ALWAYS.*)

Now, as the glue is curing, you can do the other two trays that will require the attaching of the pump, tubing, and fittings. After which - you should test for any leaks by doing a "hydro-test". Fill the tray with one liter of water and "prime" the pump. Priming the pump is rather easy - with the use of a funnel attached to the pump, with input of output, just get water into the pump housing before powering up the motor.


The Wiring From The Pump
And Connector for Power Cord
(Male Connector)


- Hydro-Test of Water Bath Tray-
(No Leaks)

Make sure that there are no leaks at the point where you drilled the holes in the trays, by placing a dry paper towel under the dry tray. I ran the pump for about 20 minutes, and everything was good.

Ok!!! Here is an “after thought” idea. Because I like simple over complected, I made a change of the overall design of the try and pump system. And it would lower the cost as well. I made the developing tray system a little more simplified. I did not drill holes for the hose input and outputs, but I placed the pump unit inside the tank. This is a non-destructive design as no hole were made into the sides of the tray, and less parts.

So... Why did I not think of this sooner? I did not “*think*”= (And - I most often “design” by what might be termed = “*Dead-Reckoning*”. I have an “idea”, but really have to go through a process of trying stuff until it works. “Imperial” as like the ancient builders and scientists did before there were Engineering Schools. - Only afterwards, and just looking at it, I felt that a bit different of a working design would be better.) I believe I was correct in the redesign of this; and no “priming” the pump either... The Fixing tray will be the same as this. (*I can not really do anything with the one I built first, except throw it in the trash. It will still work. So until if fails I shall use it.)*

See Photo Below:

As I really never know about the total out come of a prototype - And I will make changes as I build. I really want this, and other stuff, to work and work well for others that I make, I will include my changes and failures in a written article. Even that I made a drawing - you can see now it was totally useless. If you can “see it” in your mind - Go With It.

Thank you for reading. - Any questions? = Ask.

James R. Kyle, Photographer, Saint Louis, Missouri, U.S. of A.